Accountability in Education and Recognition of Bullying: An Analysis of Municipality-Level Data in Tokyo

TANAKA Ryuichi

Professor, Institute of Social Science, The University of Tokyo

BESSHO Shun-ichiro

Associate Professor, Faculty of Economics, The University of Tokyo / Former Chief Economist, Policy Research Institute, Ministry of Finance

MOROZUMI Atsuyoshi

Assistant Professor in Macroeconomics, University of Nottingham, UK / Visiting Scholar, Policy Research Institute, Ministry of Finance

Abstract

Bullying can be a major threat to students' learning environment as well as their well-being. It is thus important for schools to recognize/identify bullying early, to prevent it from leading to dire consequences such as suicide in the extreme cases. This paper investigates the relevance of accountability in education in the recognition of school bullying. Specifically, we test a conjecture that when local education policymakers are held accountable for bullying at schools under their jurisdiction, they have a strong incentive to be proactive about identifying bullying, so that the recognized cases of bullying increase. To test this, we focus on revisions of law enacted in Japan in 2014, which strengthened accountabililty of local education policymakers. Expoiting the fact that this institutional reform was implemented in a staggered manner across municipalities, we show that consistent with the hypothesis, in municipalities in Tokyo where the reform had already been implemented, recognized cases of school bullying was higher than in other municipalities where the reform had not yet been conducted. The policy implication is that improving the accountability systems in education can promote recognition of bullying, thereby possibly preventing bullying from having catastrophic effects on students.

Keywords: accountability, institutional reform, school bullying
JEL classification: I21, J24

I. Introduction

The aim of compulsory education in Japan is to develop inner qualities of students, including academic ability, that will serve as the foundation for their subsequent life. To this end, it is critical to provide students with a suitable leaning environment. However, this pre-

requisite is often not met due to the "problematic behavior" of students, most notably *bullying*. Although it is not easy to define bullying, the OECD (2017), for example, views it as "a systematic abuse of power, possibly identified by three key traits of repetition, intention to harm, and an unequal power between the bully and the victim (pp. 134)." There are various forms of bullying—physical (e.g. being hit or pushed around by another student), verbal (e.g. being teased), or relational (e.g. being the target of malicious rumors)—but regardless of the form, bullying is considered to be a major threat to students' learning environment.[1] For example, the OECD (2017) uses the results from the 2015 Programme for International Student Assessment (PISA) to show that victims of bullying tend to feel anxious and alienated, and also tend to be absent from school. Moreover, bullying can have an adverse effect not only on students' learning environment, but also on their well-being, potentially posing a serious threat even to their lives themselves.

This considerable risk is evident from the recent reports of student suicides in Japan that are attributable to bullying. Indeed, school bullying is a matter of great public concern, and there is a consensus that the issue needs to be addressed with urgency.[2] Acknowledging this, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has studied bullying circumstances since FY 1985 as part of the "Survey on various problems in student guidance such as problematic behavior and school absenteeism," ("problematic behavior survey" for short).[3] In particular, considering that the accurate grasp of current status of bullying is the first step towards effective policy intervention into this matter, MEXT, since 2006, has employed the "number of cases of bullying recognized/identified by teachers and schools" as a primary statistical index in the problematic behavior survey. This number is surveyed in all elementary, middle, high, and special education schools, and MEXT publishes the total number at each school level for each prefecture. The caveat of this bullying measure, however, is that since bullying is not usually visible (or observable) to outsiders including teachers, the number recognized may *not* reflect the actual occurrence of bullying. This means that one must always be aware of the possible deviation of the number of cases of bullying recognized from the number of bullying actually occurred.

Having clarified this point, Figure 1 (a) and (b) show the prefectural distribution of cases of bullying recognized per 1,000 students in FY 2016 (there are 47 prefectures in Japan) and the evolution of cases of bullying recognized per 1,000 students between FY 2007 and 2016 in selected prefectures. The former indicates that while the national average number of bul-

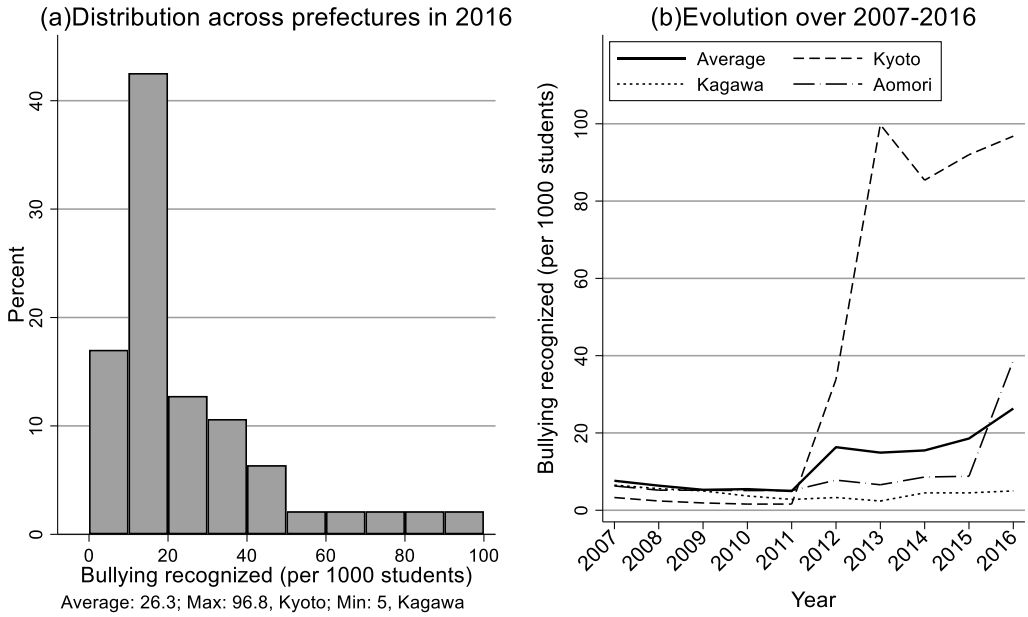
[1] The OECD (2017) reports on the characteristics of bullying in Japan as compared to the average behavior in OECD countries. The study shows that in Japan, a) a larger proportion of students (15 years old, or first-year high school students in Japan) report being teased, hit, or pushed around by other students, whereas b) a smaller proportion of students report being excluded or having personal items stolen or broken.

[2] The Anti-Bullying Act enacted in 2013 is an example of a legal measure taken against bullying in Japan. The intention of this paper is not to directly analyze the effect of legal measures on bullying. For sample overseas studies on this, however, refer to Nikolaou (2017) and Sabia and Bass (2017).

[3] MEXT currently determines whether a certain individual act qualifies as bullying from the perspective of the bullied, and defines bullying as follows: "[Bullying] is an act that causes psychological or physical damage to another enrolled student known in a social context to the bully (includes online bullying), where the student targeted by the act is made to feel distress, either within or outside of school.

lying recognized is 23.9 per 1,000 people in FY 2016, the number varies substantially *across prefectures*, ranging from the minimum of 5.0 in Kagawa Prefecture to the maximum of 96.8 in Kyoto Prefecture. Figure 1 (b) shows that there may also be a significant variation *over time*. For example, the national average jumped from 5.0 to 16.3 cases between FY 2011 to 2012, and further increased from 18.6 to 26.3 between FY 2015 to 2016. Turning to some selected prefectures, no significant changes were observed in Kagawa Prefecture, which had the lowest recognized cases of bullying in FY 2016; whereas Kyoto Prefecture, which had the highest cases in the year, showed a sharp rise from 1.6 (FY 2011) to 33.9 (FY 2012), further to 99.8 cases (FY 2013). Also, in Aomori Prefecture, the number was below the national average in FY 2015 (8.8 cases), but greatly exceeded the average in FY 2016, with the figure more than quadrupled (38.8 cases).

Figure 1: Prefectural distribution and evolution of recognized cases of bullying



Note: (a) Created from MEXT, "Survey on various problems in student guidance such as problematic behavior and school absenteeism," FY 2016 edition. The total cases across elementary, middle, high, and special education schools, per 1,000 students. The national average is 23.9 cases, the maximum is 96.8 cases in Kyoto Prefecture, the minimum is 5.0 cases in Kagawa Prefecture. (b) Created from MEXT, "Survey on various problems in student guidance such as problematic behavior and school absenteeism," FY 2016 edition. The total cases across elementary, middle, high, and special education schools, per 1,000 students.

The question is: *Why* does the recognized cases of school bullying show substantial regional variations and fluctuations over time? Since, as mentioned, the number of cases recognized can be different from the number of actual occurrences, we have two possible hypotheses. The first is that the number of actual cases of bullying does vary substantially by region, and also does change significantly over time, explaining the observed variations in

recognized cases of bullying by region and across time. However, the second hypothesis is that the *attitudes* and *efforts* of education policymakers, teachers, and schools towards bullying recognition may differ across regions and change over time, driving regional disparities and time-series variations in the recognized cases of bullying. Of course, both hypotheses may simultaneously be true. However, as argued below, our view is that the actual number of bullying, albeit unobservable, is *unlikely* to exhibit large regional or time-series variations. Thus, this paper highlights the second possible hypothesis that the number of recognized cases of bullying have shown substantial variations, *as a result of* variations in the attitudes and efforts of the education policymakers and schools towards bullying recognition.

Specifically, this paper considers a change in the *accountability system* in education policy as a possible reason why the attitudes and efforts of policymakers and schools towards bullying recognition might have changed in Japan. In particular, we highlight an institutional reform caused by the 2014 revisions to the Local Educational Administration Law (referred to hereafter as the "2014 revisions"), enacted as a result of a public debate on the death of a second-year middle school student in Otsu, Shiga Prefecture because of suicide from school bullying in 2011. In essence, this tragic incident exposed two then inherent issues in the accountability system in local education policies. First, since municipality education boards—education policymakers in Japan at a municipality level—were collective executive organizations led by the "superintendent of education" (who formulated and implemented education policies) and the "chair of education board" (who supervised the superintendent and checked policies), the *coexistence* of these two senior officials obscured who is ultimately accountable for education matters. Second, the appointment responsibilities of the mayor were also obscured by the *joint* appointment structure, in which the superintendent of education was *not* directly appointed by the mayor, who represents the general public, *but* by the mayor-appointed education board. However, after it became evident to the public that the problems with the accountability system prevented a thorough investigation of the aforementioned suicide incident, the law has been revised in the following two ways. First, under the new system, the "new" superintendent of education was established as a role *integrating* the (old) superintendent of education and the chair of municipality education board, and designated as the *primary* figure accountable for local education matters. Second, the mayor was given the authority to directly appoint the new superintendent of education with consent from the assembly. Overall, the reform has strengthened the accountability system in education in Japan, in that it has clarified where accountability lies in local education system.

Then, *how* did the change in the accountability system alter attitudes of education policymakers towards bullying recognition, and what happened to recognized cases of school bullying? It is not easy to anticipate answers to these questions. However, many overseas studies, including ones in the United States, have shown that a fundamental reform of accountability systems can have substantial impact on education outcomes. For example, Rockoff and Turner (2010) show that in New York City, strengthening accountability of

schools for student academic performances improved student achievement. Specifically, they find that linking school's test results to rewards for schools enhanced the academic performance of students attending low-performing schools.[4] Figlio and Loeb (2011) provide a number of examples in the United States where creating systems that strengthen school accountability led to improvements in various education outcomes. Although the aforementioned institutional reform in Japan established the accountability of policymakers (in particular, new superintendent of education) rather than schools, and they were not particularly held accountable for improving student academic achievements, the essence of the reform was still to strengthen the accountability system in education, as in the reported US cases. Then, since (1) the public now holds the new superintendent of education accountable for education matters including school bullying, and (2) the superintendent is also responsible for the management of public schools within municipalities (as explained below), it appears reasonable to conjecture that "after the reform, education policymakers led by the superintendent have a clear incentive to recognize and address a bullying problem early, certainly before serious incidents such as student suicides occur, so that recognized cases of school bullying increase under his/her jurisdiction."[5]

To test this conjecture, we use data on municipality-level cases of bullying recognized, taken from the annual Tokyo Metropolitan Government survey.[6] Our estimation of the accountability effect exploits the fact that after the 2014 revisions, the new system with the new superintendent of education has been installed across municipalities in Tokyo in a *staggered* manner. This gradual transfer to the new system happened because the end of the tenure of the old superintendent of education due to either expiration of term or resignation came at different times across municipalities. Exploiting this gradual transition to the new system, we estimate a regression model with both municipality and fiscal year fixed effects. We find that in municipalities where the new system had already been introduced, recognized cases of school bullying was higher than in other municipalities where the new system had not yet been introduced. This result is consistent with the hypothesis that under the system where education policymakers are properly accountable for school bullying, they have a clear incentive to be proactive in identifying cases of bullying at schools under their jurisdiction, to avoid the possible occurrence of serious incidents such as suicide.

This paper is in a strand of literature studying how education institutions shape accountability of agents and affect educational outcomes as a result. One novel feature of this paper, however, is to link institutions with recognized cases of school bullying as an outcome variable, rather than (more commonly investigated) academic achievements. Broadly, there are several works on the topic of school bullying. Sarzosa and Urzua (2015), and Sarzosa (2017) use panel data from a Korean middle school to build a dynamic model of skill formation,

[4] Prior to this, Hanushek and Raymond (2005) show that the systematization of accountability contributed to enhancing the academic performance of students in the United States. Rouse et al. (2013) show that schools in Florida put under the pressure of accountability increased test scores by changing the way they teach.

[5] We cannot deny the possibility that accountability intimidates teachers and administration officials into being reluctant to report cases of bullying.

[6] This survey is officially known as "Survey to assess the number of cases of bullying recognized and responses"

and analyze the effect of bullying on academic achievement and non-cognitive abilities. Eriksen, Nielsen, and Simonsen (2014) employ data from Denmark, and find that bullying leads to a decrease in GPA (grade point average). Likewise, Ponzo (2013) uses data from Italy to show that victimization of bullying in elementary and middle school results in lower grades. Further, Brown and Taylor (2008) use data from the United Kingdom to show that victims of school bullying tend to have lower levels of final education, and earn lower wages as adults. Overall, these studies show that bullying has a significant effect on the formation of academic skill and abilities, motivating our investigation of the role of accountability in school bullying.

Nakamuro (2017), Tanaka (2019), and Tanaka and Morozumi (2019) all analyze the recognized cases of school bullying in Japan as an outcome variable. Nakamuro (2017) analyzes the effect of class sizes on recognized cases of bullying using school-level data provided by a municipality within the Kanto region.[7] She finds no significant relationship between a class size and cases of bullying recognized. Tanaka (2019) uses prefecture-level panel data to analyze the effect of additional teacher allocation on academic ability and problematic behavior. Tanaka and Morozumi (2019) use school-level panel data from a government-designated city to examine the role of home economic environment in the effect of additional teacher allocation on problematic behaviors in public middle schools. Both of these studies also find no statistically significant relationship between the number of additional teachers and recognized cases of bullying. A main feature of this current paper lies in its use of the natural experimental condition created by the institutional reform to analyze the effect of accountability on recognized cases of bullying.

This paper is organized as follows. Section 2 discusses the determinants of cases of bullying recognized, and Section 3 explains the reformation of the Board of Education system. Section 4 describes the regression model, and Section 5 introduces the data used in analysis. Section 6 describes the estimation results, and Section 7 discusses the robustness of the results. Section 8 concludes.

II. Recognition of Bullying and the Actual Occurrence

The previous section pointed out that the large regional and time-series variations in the number of cases of bullying recognized are likely to be explained not by variations in the actual number of cases but by variations in the attitudes and efforts of education policymakers towards recognizing cases of bullying. In this section, we present two arguments consistent with this claim.

The first argument is that regional and time-series variations in the students' consciousness towards bullying are seemingly *unrelated* to the variations in recognized cases of bullying. The premise to this argument is that "the more students perceive that bullying cannot be justified under any circumstances, the less cases of bullying should actually occur". Here,

[7] Kanto region consists of 7 prefectures, located in the east of Honshu (the main island of Japan), including Tokyo prefecture.

we examine the proportion of sixth and ninth graders who responded, "Agree" to the question, "Do you think bullying is unacceptable under any circumstances?" in the National Assessment of Academic Ability student questionnaire, to check whether this proportion shows regional and time-series variations similar to the variations in recognized cases of bullying.[8,9]

Figure 2 shows how the average of the proportions of those graders who agreed in Aomori, Kyoto, and Kagawa prefectures evolved between FY 2007 and 2016. It shows that the larger proportion of students came to consider bullying as unconditionally impermissible (67.4% and 78.95% in 2007 and 2016, respectively), whereas Figure 1 (b) showed that the national average of recognized cases of bullying *increased* over the same period (particularly after FY 2011). In addition, comparing the Kyoto and Kagawa prefectures, which respectively had the maximum and minimum numbers of cases recognized in FY 2016 (a difference of nearly 20 times), Figure 2 shows almost *no difference* in the students' perception about the justifiability of bullying in the same year (79.65% and 80.85% in Kyoto and Kagawa, respectively). Moreover, the sharp increase in recognized cases of bullying in Kyoto between FY 2012 and 2013 (Figure 1 (b)) is accompanied by an *increase* in the proportion of students that recognize that bullying is unconditionally wrong. The same could be said for the sharp rise in cases of bullying recognized in Aomori between FY 2015 and 2016. Overall, to the extent that the students' perception of bullying is related to actual occurrences of bullying, the relationship between recognized and actual cases of bullying is considered to be weak.

Second, we present the survey results on bullying conducted by the National Institute for Educational Policy Research (2016) over 12 years between 2004 and 2015. The survey was conducted twice a year, at the end of June and also the end of November (corresponding to 3 months after the start of spring and autumn semesters, respectively), targeting all students between the 4th and 9th grade in 13 elementary and 6 middle schools in regional cities in Japan. A key feature of this survey is the careful consideration given to students who are reluctant to give honest responses out of privacy concerns. For example, self-sealing envelopes and forms were distributed to the students in the survey so that each student could quickly enclose the survey on his/her own. Therefore, the survey responses are arguably a reasonably accurate reflection of the actual state of bullying.

Figure 3 shows 12-year evolution of the proportion of middle school students (an unweighted gender average) who reported that they were a victim of "social exclusion, ignorance, and malicious gossips". Those proportions are calculated for different frequencies. To illustrate, on average, over the 12 years, 32.2% of middle school boys have experienced social exclusion, ignoring, or malicious gossips either "1-2 times to date (since the start of the new semester)," "2-3 times per month," or "1+ times per week."

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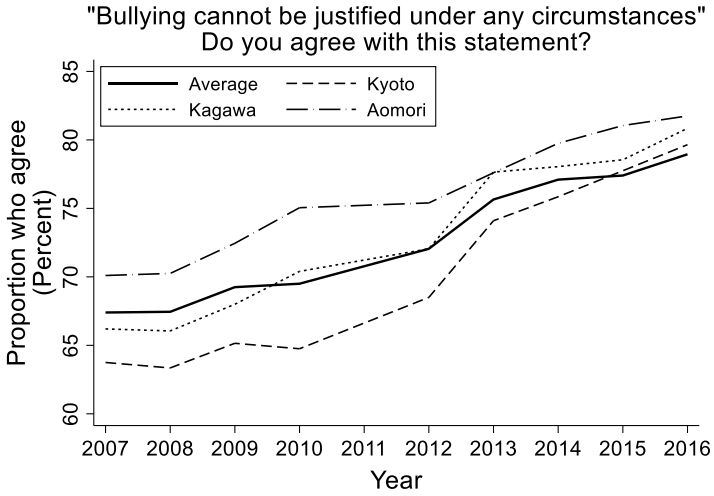
[8] Other possible responses include, "somewhat agree," "somewhat disagree," and "disagree."

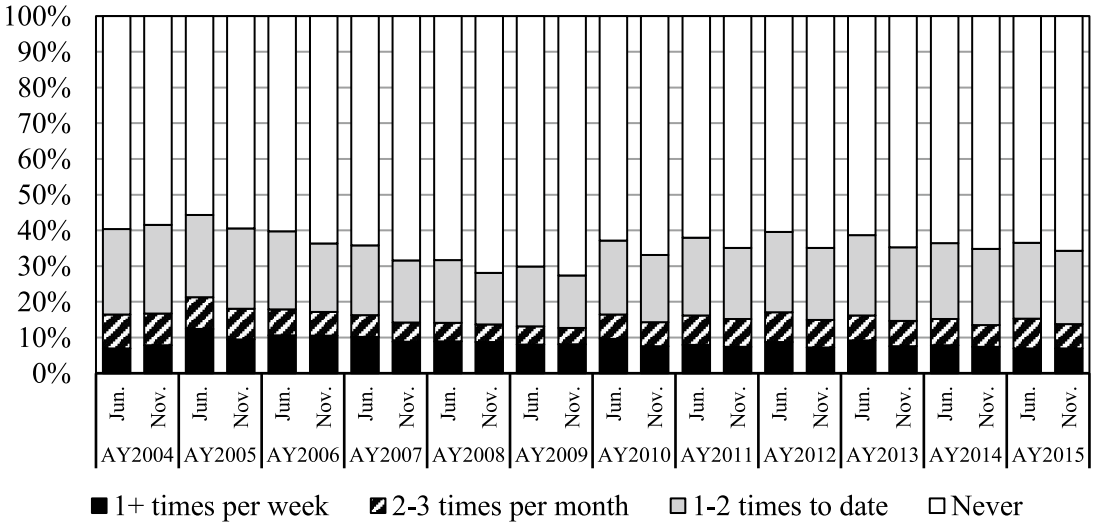
[9] National Assessment of Academic Ability has been administered each year since FY 2007 to sixth and ninth grade students (grade 3 of middle school) in Japan, except for FY 2011 when the Great East Japan Earthquake struck. Questions about bullying are included each year in both the elementary and middle school questionnaires.

Figure 2. Variations in students' perception on bullying



(Note) The average of the proportions of the 6th and 9th graders who agreed to the statement. The 2011 value (no survey because of the Tohoku earthquake) is the average of the 2010 and 2012 values.

Figure 3. Evolution in the percentage experiencing exclusion, ignoring, malicious gossip (middle school students, simple average of both genders)



(Note) Created from the "Bully Survey 2013-2015" by the National Institute for Educational Policy Research. Average of both genders.

However, the key observation here is that to the extent that these survey results reflect the actual cases of bullying occurred, there seems to be little indication that actual occurrences exhibit sudden multifold surges over time, as seen in recognized cases of bullying.[10]

III. Reformation of the Board of Education System

This section describes the reforms to the board of education that brought about fundamental changes to the accountability system in education policy.[11] Education boards have been established in the "Act on the Organization and Operation of Local Educational Administration" (referred to hereafter as the "local educational administration act"); they are a panel-based executive authority typically made up of 5 members, located in prefectures, municipalities, ordinance-disignated cities, and special wards in Tokyo. Education boards are administrative committees independent of the mayors, and are responsible for the administration of academic education, social education, sports, and culture. In particular, education boards play a central role in the administration of local education (other than budget execution), including the establishment and management of public schools in municipalities, personnel administration, training for teachers, and the selection of textbooks.

Prior to the aforementioned 2014 revisions, education boards elected the "chair of education board" from among the usual five members (all given the tenure of 4 years) to preside over and lead the meetings as a representative. The term of the chair lasted one year, albeit eligible for reappointment. The "superintendent of education" was also part of the education board and was the head of the board of education secretariat, responsible for formulating and implementing education policies applicable to his/her own jurisdiction. The term of the superintendent of education usually lasted 4 years (eligible for reappointment). While the superintendent worked as a full-timer, the chair and other members of the board worked as a part-timer.

What was distinctive about this old system was that while the superintendent of education was responsible for policy formulation and implementation, the chair of education was assigned a role of supervising the superintendent of education, and also checking the policies. Thus, the *coexistence of two heads* within one board was widely perceived to obscure who was ultimately accountable for education matters at a local level. Additionally, the appointment responsibilities of the mayor was also obscured by *joint appointment structure*, whereby the superintendent of education was not directly appointed by the mayor, who represents the public, but by the mayor-appointed education board.

The fundamental flaw of this accountability system was fully exposed in the aftermath of the 2011 bullying-induced suicide of a second-year middle school student in Otsu, Shiga Prefecture.[12] What happened was that fellow students of the student had reported the evident bullying to the school prior to the suicide, and a retrospective survey revealed that many students had been aware of this actual occurrence of bullying. Despite this, the school had

[10] Taki (2007) and the National Institute for Educational Policy Research (2016, 2017) point out that very few children can be labeled as "bullies" (always doing the bullying) or the "bullied" (bullying victims always on the receiving end of bullying); most students are involved in bullying as both victims and perpetrators. Also, the National Institute for Educational Policy Research (2017) points out that a characteristic of bullying in Japan is that children with high scientific literacy often experience bullying as victims.

[11] Murakami (2014) provides a detailed overview of the Boards of Education's systems and their reforms.

[12] For the background and history of this case, refer, for example, to Kyodo News Osaka (2013).

identified the issue as an altercation among students rather than bullying, and even after the suicide, the chair and members of the education board, who were to instruct and supervise the superintendent, had not been fully informed of the incident. All the poor responses by the education board and the school led to social criticism. Eventually, a third-party investigative committee formed by the Mayor of Otsu concluded that the suicide was caused by bullying. However, by that time, widespread public discussions had occurred regarding the flaw of the accountability system in local education administration.

Against this background, Prime Minister Abe's second administration took office and launched a reform of the education board system. The 2014 revisions to the local educational administration act made a change to the accountability system, establishing a "new" superintendent of education that *integrated* the roles of the (old) superintendent of education and the chair of education board (referred to hereafter as the "new superintendent of education"). This new position was designated as the *primary* authority with respect to local educational administration. Education boards do not supervise the new superintendent of education, and the authority to appoint the new superintendent is now with the mayors rather than the board. Thus, this reform has firmly established the superiority of the new superintendent of education over the education board. Also, the direct appointment of the new superintendents by mayors with consensus from the municipal assembly helped clarify the responsibilities of the mayors in educational administration. In short, the gist of the 2014 revisions was that *they clarified where accountability lies* in local education systems.

For later reference, it is worth mentioning here that the reform also granted mayors the authority to formulate educational guidelines of municipality (which set the goals and basic principles of education policy of the municipality), and stipulated that the mayors and education boards meet at the General Education Conference to discuss and coordinate affairs, strengthening the mayors' influence in education policymaking as a result. The implication is thus that an appointment of the new mayor could correspond to certain changes in education policies. In the regression analysis below, we conduct the analysis taking account of the possible effects from changes in mayors.

Regarding the timing of the reform, the transition to the new education board system has been underway since April 1, 2015, but the actual timing of transition varied by municipality. This was for two reasons. The first was that, as a transitional measure to the 2014 revisions, it was designated that the existing (old) superintendents remain in office until the end of their current term with the board (cf. Local educational administration act, Article 2 of the Supplementary Provisions). The second was that, in the event that the old superintendent resigned before the end of their current term during the transitional periods, a new superintendent would be appointed to transition to the new system, but the timing of this appointment would vary by municipality.

Table 1 summarizes the timing of the transitions by each municipal education board falling under the Tokyo prefectural education board considered in this study.[13] For example, Adachi, Shibuya, and Suginami wards transitioned to the new education board system on April 1, 2015, but we observed significant variations in the timing of the transitions, with

some municipalities even scheduled for 2018.[14] Thus, the differences in transition timing to the new system caused the coexistence of municipal education boards *operating under different systems*, even within Tokyo. In the next section, we will exploit these municipality level variations in transition timing to identify the effects of the 2014 reform in the regression analysis.

IV. Regression Model

The primary hypothesis of this study is that "reform of the education board and resulting changes in the accountability system increased the number of recognized cases of bullying." In this section, we explain our econometric specification to test this hypothesis. Our regression model is as follows:

$$\log(\text{ninchi}_{i,t}) = \alpha\ \text{reform\_imme}_{i,t} + \beta\ \text{reform\_post}_{i,t} + \gamma\ \text{reform\_post2}_{i,t} + \delta_i\ \text{new\_mayor}_{i,t} + \sum_{j=1}^{m}\delta_j z_{i,j,t} + \nu_i + \xi_t + \epsilon_{i,t} \quad (1)$$

Here, the dependent variable $log\_ninchi_{i,t}$ represents the logarithm of the number of cases of bullying recognized in elementary and middle schools during fiscal year t and in municipality i in Tokyo. As we explain later, in FY 2014 to 2017 the survey period of the "Survey to assess the number of cases of bullying recognized and their responses" is between April 1 and June 30 of each year.

The explanatory variables that we are most interested in are the transition to the new education board system, that is, *reform_imme,* reform*_post,* and *reform_post2.*[15] We include these three variables to estimate the time-varying effect of the system transition on the number of cases of bullying recognized. We categorized the Tokyo municipalities into four groups to accurately define these variables.

Group 1: Transition to the new system occurred between April 1, 2015 and April 30, 2015. For these municipalities, we assumed that the number of cases of bullying recognized by June 30, which is the end of the 2015 survey period, would reflect the effect of the systematic transition. That is, we assumed that the effect of the transition would be realized within 2-3 months and reflected in the cases recognized; we assumed that the figures for cases of bullying recognized in 2015, 2016, and 2017 would be affected by the changes of education system.

Group 2: Transition to the new system occurred between May 1, 2015 and April 30,

[13] We referred to the websites of each education board for information regarding the transition to the new system, and verified the timing for the 58 Tokyo municipalities excluding four villages.

[14] This paper was written in November 2017.

[15] In this study, we assume that these variables are exogenous because the timing of transition is dependent on the timing of past superintendent appointments. It is possible that municipalities actively taking initiative against bullying might force (encourage) superintendents of the old system to resign in the middle of their term. However, we believe this likelihood to be low, as the Ministry of Education, Culture, Sports, Schience and Technology (MEXT) communicates that superintendents must "stay in office until the final day of term."

Table 1. Timing of transition of Tokyo municipalities to the new Board of Education system

Municipality	Transition year	Month	Date	Municipality	Transition year	Month	Date
Chiyoda-ku	2017	10	19	Machida-shi	2018	4	1
Chuo-ku	2015	7	1	Koganei-shi	2015	10	1
Minato-ku	2016	10	12	Kodaira-shi	2016	10	1
Shinjuku-ku	2016	4	1	Hino-shi	2018	8	3
Bunkyo-ku	2015	7	8	Higashimurayama-shi	2016	1	1
Taito-ku	2016	10	1	Kokubunji shi	2017	5	26
Sumida-ku	2015	10	1	Kunitachi-shi	2015	5	24
Koto-ku	2017	4	1	Fussa-shi	2015	4	1
Shinagawa-ku	2017	4	13	Komae-shi	2018	4	1
Meguro-ku	2016	10	1	Higashiyamato-shi	2016	4	1
Ota-ku	2017	12	22	Kiyose-shi	2016	4	1
Setagaya-ku	2016	12	1	Higashikurume-shi	2015	4	1
Shibuya-ku	2015	4	1	Musashimurayama-shi	2015	4	1
Nakano-ku	2015	4	1	Tama-shi	2015	10	1
Suginami-ku	2015	4	1	Inagi-shi	2018	10	15
Toshima-ku	2017	1	5	Hamura-shi	2015	10	1
Kita-ku	2015	12	7	Akiruno-shi	2015	11	26
Arakawa-ku	2017	4	2	Nishitokyo-shi	2017	7	1
Itabashi-ku	2015	7	1	Mizuho-machi	2018	4	15
Nerima-ku	2015	7	1	Hinode-machi	2015	12	15
Adachi-ku	2015	4	1	Hinohara-mura			
Katsushika-ku	2016	10	5	Okutama-machi	2016	10	1
Edogawa-ku	2015	4	1	Oshima-machi	2016	7	1
Hachioji-shi	2016	4	1	Toshima-mura			
Tachikawa-shi	2016	4	1	Niijima-mura	2015	6	29
Musashino-shi	2015	4	1	Kozushima-mura	2016	10	1
Mitaka-shi	2015	10	1	Miyake-mura	2015	10	1
Ome-shi	2015	10	13	Mikurajima-mura			
Fuchu-shi	2015	4	1	Hachijo-machi	2015	10	7
Akishima-shi	2016	4	1	Aogashima-mura			
Chofu-shi	2015	10	1	Ogasawara-mura	2015	9	26

(Note) Based on information gathered from the municipality websites. A blank cell denotes lack of information on the website. If no transition had taken place by the time of writing (November 2017), the table lists the date of the expected end of the former system's superintendent of education's term.

2016. For these municipalities, a transition in May 2015 would only leave 1-2 months before the end of the survey period, thus we assumed that the system transition would not affect the numbers of cases of bullying recognized before June 30 (the end of the 2015 survey period). Thus we assumed that the changes of education system would only affect the cases recognized in the 2016 and 2017 surveys.

Group 3: Transition to the new system occurred between May 1, 2016 and April 30, 2017. For these municipalities, under the same assumptions as above, the systematic transition only affects the cases of bullying recognized from the 2017 survey.

Group 4: Transition to the new system occurred after May 1, 2017 or has not yet occurred. For these municipalities, all cases of bullying recognized between 2014 and 2017 are affected by the former educational system.

By categorizing the municipalities into four groups, we can define the aforementioned variables, *reform_imme*, reform*_post,* and *reform_post2* as follows:

reform_imme: A variable that measures the effect on cases of bullying recognized immediately after the transition to the new Board of Education system. It is a binary variable that takes the following values in accordance with the grouping above: value of 1 in 2015 for Group 1; 1 in 2016 for Group 2; 1 in 2017 for Group 3; and 0 for all other years. In Group 4, the number of cases of bullying recognized is unaffected by the system change between 2014 and 2017, thus it takes the value of 0 for all years.

reform_post: A variable that represents the effect on cases of bullying recognized one year after the transition to the new system. Specifically, it is a binary variable that takes the following values: value of 1 in 2016 for Group 1; 1 in 2017 for Group 2; and 0 for all other years. In Groups 3 and 4, it takes the value of 0 for all years.

reform_post2: A variable that represents the effect on cases of bullying recognized two years after the transition to the new system. It is a binary variable that takes the value of 1 in 2017 for Group 1 and 0 in all other years. For Groups 2, 3, and 4, it takes the value of 0 in all years.

new_mayor is a dummy variable to control the effects of mayor changes to the number of cases of bullying recognized. We consider this variable because, as mentioned earlier, the other pillars of the education board system reform—that is, the formulation of educational guidelines and establishment of a general education conference—generally elevated the influence of the mayors over education policies, and thus it is possible that the replacement of the mayor would affect anti-bullying interventions, which are a primary educational policy. Because these reforms occurred uniformly in April 2015 across all municipalities in Japan, it is important to consider replacements of mayors in the sampling period from 2014 to 2017, within the sampling period. Specifically, if the mayor of a given municipality changed on April 1, 2015, this variable would be 0 in 2014, and 1 from 2015 to 2017.[16,17] Moreover, we assume that the coefficient of this variable is specific to the municipality, as the proposed

[16] Specifically, we assumed that if the new mayor was appointed before April 30, 2015 (2016, 2017), the appointment could affect the number of cases of bullying recognized in 2015 (2016, 2017).

bullying interventions were likely to differ by individual mayor.

z is control variables for other factors. For example, we can consider factors such as class size, which is thought to affect the level of faculty attention given to students; enrollment support rate, which reflects the economic circumstances at home; and public education expenditure per student. In the analysis below we consider class size. The reasons for this are as follows: 1) because the rate of school financial assistance receipt does not show large temporal changes within municipality, the effects are absorbed by municipality fixed-effects (described below), and 2) because public education expenditure data is only published through FY 2015 (as of November 2017, the time of analysis), those data are infeasible for our analysis. Finally, v_i represents municipality fixed-effects, which controls factors specific to municipalities, including unobserved factors. ξ_t represents the fiscal year fixed-effects, used to absorb the effects from uniform shocks across all of Tokyo. The fiscal year fixed-effects include uniform interventions for bullying taken by the Tokyo Board of Education, which exists separately from the municipal Boards of Education.

V. Data

The data used in this study to measure the outcome is the number of cases of bullying recognized by municipality, sourced from the Tokyo Metropolitan Government's "Survey to assess the number of cases of bullying recognized and their responses." The survey has been conducted annually since 2012, and the data can be accessed on the Tokyo Metropolitan Government website.[18] In this study, we limited the sample period from 2014 to 2017, before and after the transition to the new education board system.[19] The sample consists of 58 municipalities (out of the 62 Tokyo municipalities), where the timing of the transition to the new system could be verified on the municipality (or education board) website.

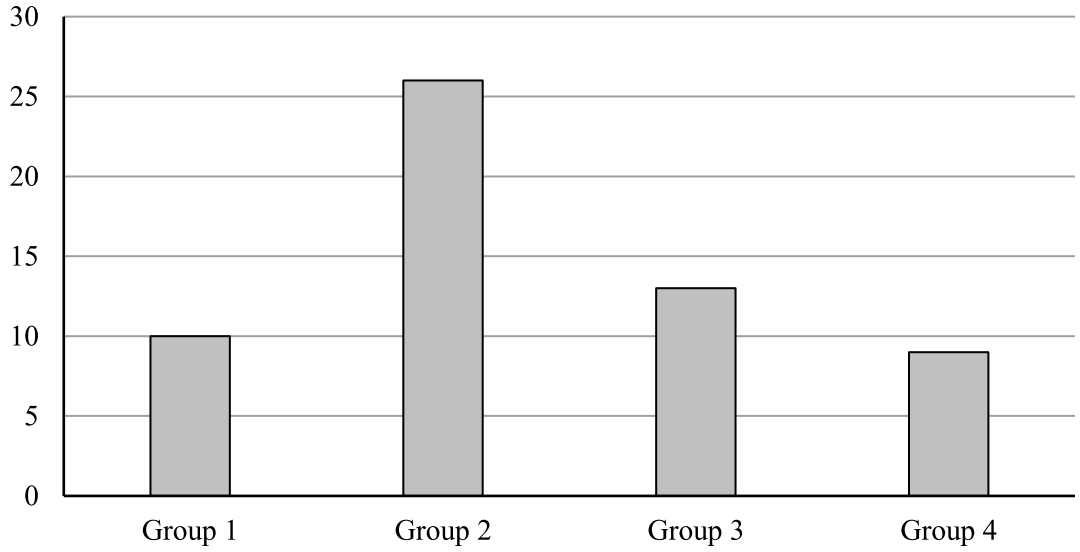
We categorized the 58 municipalities into the four groups described above, based on Table 1. Figure 4 depicts the distribution of timing when municipalities have transitioned to the new education board system after April 1, 2015. Group 2 was the largest subset, as over 40%, or 26 municipalities, transitioned to the new system between May 1, 2015 and April 30, 2016. Of the 58 municipalities of our sample municipalities, less than 20%, or 10 municipalities, had transitioned to the new system by April 30, 2015, as soon as the transition became possible (Group 1). More than 20%, or 13 municipalities, transitioned between May 1, 2016 and April 30, 2017. The remaining 9 municipalities transitioned after May 1, 2017

[17] The variables are defined by municipality and on a yearly (FY) basis. However, if no change in mayor occurred between 2014 and 2017 in a given municipality, the variable coefficients are not estimated because the variables are collinear with the fixed effects.

[18] Statistics by municipality or by school from MEXT's "Survey on Problematic Behaviors" were not available at the time of writing.

[19] One reason for limiting the sample period is that the survey method of cases of bullying recognized in Tokyo in 2012 and 2013 differs from the survey method between 2014 and 2017. Specifically, the survey period in Tokyo from 2014 to 2017 spanned April 1 to June 30 of each year; whereas, the survey in 2012 was a special survey conducted in July, and the survey period in 2013 spanned April 1 to September 30. Thus the data from 2012 and 2013 cannot be directly compared to data from subsequent years.

Figure 4. Number of municipalities transitioning to the new system



(Note) Created from the websites of Tokyo municipalities.

Table 2. Descriptive statistics

Variable	(1) N	(2) Mean	(3) Standard Deviation	(4) Minimum	(5) Maximum
Number of cases of bullying recognized per 1,000 students (elementary school)	248	8.530	26.04	0	268.1
Number of cases of bullying recognized per 1,000 students (middle school)	248	7.134	8.447	0	64.94
Class size (public elementary school)	248	25.72	7.316	2.250	31.23
Class size (public middle school)	248	27.78	8.487	1	34.50
Number of municipalities	54	54	54	54	54

(Note) Created from the annual editions of the Tokyo Metropolitan Government reports, "On the survey results to assess the number of cases of bullying recognized and their response at Tokyo metropolitan area public schools" and "Public School Statistical Survey Report."

or had not yet transitioned (as of November 2017, the time of writing).

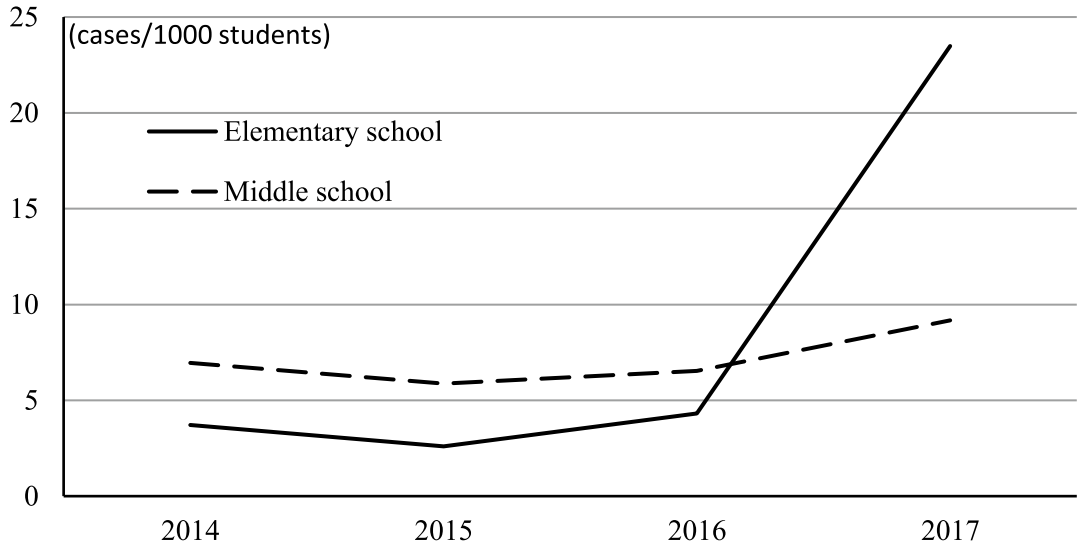
The sources of data other than cases of bullying recognized and municipal transitions to the new education board system are as follows. We created the data on changes of the mayor of each municipality by referencing the website, "Senkyo dot com (go2senkyo.com)" for election information during the analysis period. Of the other control variables, we calculated class size based on the "Public School Statistical Survey Report" (Tokyo Metropolitan Government) by dividing the number of students attending public schools by the number of classes. Table 2 summarizes the descriptive statistics of the data for analysis.

On average, the number of cases of bullying recognized per 1,000 students is higher

among elementary school students than middle school students. Furthermore, we observe that there is larger variation among elementary school students over middle school students as shown by the larger standard deviation. However, as the historical trend in Figure 5 shows, the number of cases of bullying recognized lower in elementary schools until 2016, but rises sharply in 2017.[20]

Figure 6 shows the trends in elementary school cases of bullying by group, categorized by each municipality's timing of transition to the new education board system. The figure shows that in FY 2014, before the transition to the new system, there is no significant difference among groups concerning cases of bullying recognized. We did not see clear trends for each group in subsequent years, but we can observe that in FY 2016 and 2017, the number of cases of bullying recognized was smaller in Groups 3 and 4, who had later transition periods than Groups 1 and 2 that had transitioned quickly to the new system.

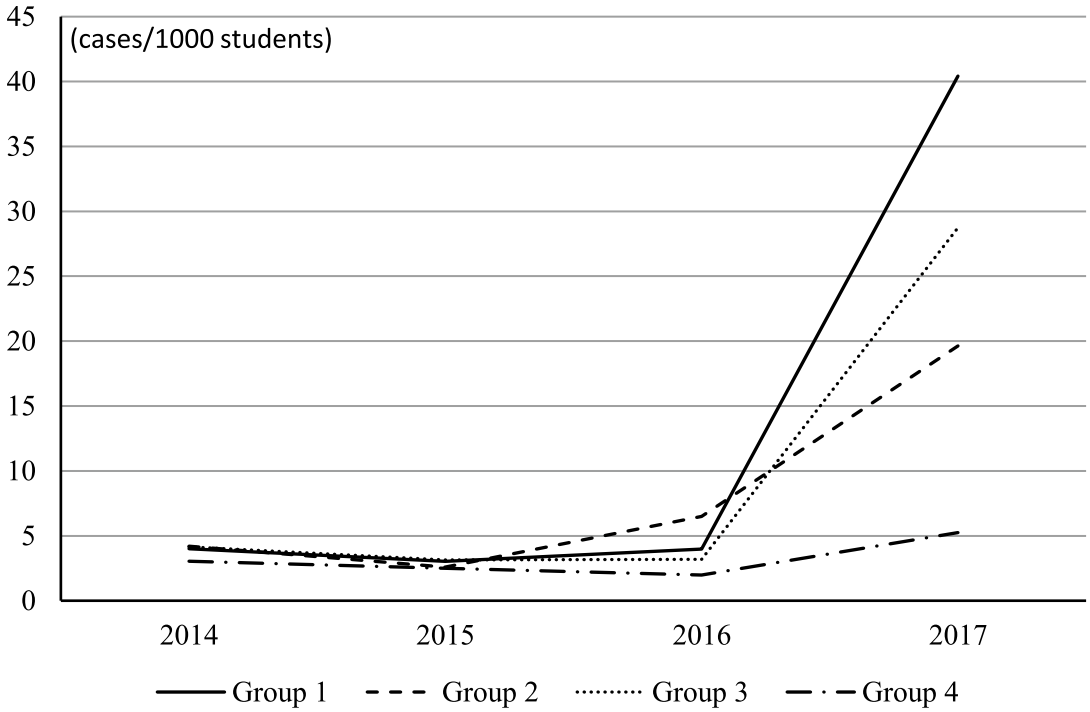
Figure 5. Historical trends in cases of bullying recognized in Tokyo



(Note) Created from the annual editions of the Tokyo Metropolitan Government report, "On the survey results to assess the number of cases of bullying recognized and their response at Tokyo metropolitan area public schools."

[20] The Tokyo Metropolitan Government explains the reason for the 2017 increase as follows. "Based on a perception that bullying can happen to any student at any school, municipal education boards, school principals, and teachers have been all reminded repeatedly to recognize/identify any bullying cases without overlooking them. Thus, schools, perceiving that a rise in the recognized cases of bullying is not necessarily a problem, have come to recognize bullying proactively, thereby contribution to the 2017 rise in the recognized cases."

Figure 6. Historical trends in cases of bullying recognized by groups classified according to the timing of their transition to the new system



(Note) Created from the annual editions of the Tokyo Metropolitan Government reports, "On the survey results to assess the number of cases of bullying recognized and their response at Tokyo metropolitan area public schools" and the "Public School Statistical Survey Report."

VI. Estimation Results

Table 3 (elementary school) and Table 4 (middle school) report the estimation results of the regression model described in Section 4 using the data described in Section 5. Columns 1 to 3 in Table 3 take the logarithm of the cases of bullying recognized in elementary schools as a dependent variable and use the ordinary least-squares method to estimate a model that regresses to the variables representing the municipal transition to the new education board system. The first column shows the results controlling for only the fiscal year fixed-effects and municipality fixed-effects. The transition to the new system does not have a statistically significant effect on the number of cases recognized in that same year, but has a statistically significant positive effect on bullying figures 1-2 years later. Specifically, 0.47 (1.32), the point estimate of coefficient of *reform_post (reform_post2)* reveals that after 1 year (2 years) following the transition to the new system, the numbers of cases recognized are approximately 47% (132%) higher than under the old system.

Next, the second column shows the results of controlling the class size as a covariate. Even when controlling the class size, there is hardly any change in the statistical signifi-

cance and magnitude of the coefficients of variables representing the transition to the new system. The negative coefficient for class size suggests a negative correlation between class size and cases of bullying recognized, however this relationship is not statistically significant.

The third column shows the results when considering an additional control variable, that is, the dummy variable (*new_mayor*) that is 1 if the mayor is replaced. The effects of the system transition are more strongly detected when we consider the replacement of the mayor; the effects further increase one or two years after the transition to the new system. At the same time, there are statistically significant positive effects on the number of cases of bullying recognized immediately after the transition to the new system.

Moreover, we add that, although we omit the *new_mayor* coefficients of each municipal-

Table 3. Transition to the new system and the number of cases of bullying recognized (elementary school, all municipalities in Tokyo)

	(1)	(2)	(3)
Variables	OLS	OLS	OLS
reform_imme	0.28	0.30	0.36*
	(1.49)	(1.66)	(1.88)
reform_post	0.47*	0.49*	0.60**
	(1.71)	(1.78)	(2.04)
reform_post2	1.32**	1.36**	1.54**
	(2.22)	(2.36)	(2.61)
Class size		-0.20	-0.19
		(-1.33)	(-1.27)
Year dummy	yes	yes	yes
Municipality dummy	yes	yes	yes
Mayor changes dummy	no	no	yes
Constant term	1.15***	6.65	6.60
	(13.62)	(1.61)	(1.54)
Sample size	219	219	219
No. municipalities	57	57	57
Adj. R2	0.368	0.373	0.379
Joint hypothesis test (p-value)	0.140	0.0937	0.0512

(Note) Numbers in the parentheses denote t-values using a standard error that is robust to the correlation of error terms in the municipalities.
***p<0.01, **p<0.05, *p<0.1

ity from the table, these variables are statistically significant in many municipalities (the sign varies by municipality).

We conducted an analysis using three dummy variables related to the system transition, to capture the delayed effects of the transition on the number of cases of bullying recognized. To examine the presence of the overall effect, in the final row of each column we presented the result (*p*-value) of a joint hypothesis test whether the coefficients of these three variables are simultaneously and statistically significantly different from 0.

In the results that consider only the fixed effects of the fiscal year and municipality, the *p*-value of the joint hypothesis test is 14 percent, but in the model that considers class size and mayor changes, the *p*-value is 5.1 percent. These results show that the transition to the new education board system has led to an overall increase in the number of cases of bullying recognized.

Next, we show the results of an analysis using middle school cases of bullying recognized as a dependent variable. Columns 1 to 3 in Table 4 use the ordinary least-squares method to estimate a model that takes the logarithm of the middle school cases of bullying recognized as a dependent variable. The first column shows the results controlling for only the fixed effects of the fiscal year and municipality. From this, we observe that the system transition has a statistically significant effect on cases of bullying recognized in that same year and 2 years later. These results are robust even when adding covariates. There is little difference between the coefficients in the second and third columns and those in the first column. Similar to the elementary school results, the class size coefficient is estimated negative, but the relationship is not statistically significant.[21]

Similar to the analysis of the elementary school data, we tested the overall effect and show in the final row of each column the result (*p*-value) of a joint hypothesis test whether the coefficients of the three variables (representing systematic transition) are simultaneously and statistically significantly different from 0.

In all specifications, the *p*-values are below 10 percent. We can say that the transition to the new system has also led to an overall increase in the number of cases of bullying recognized in middle school.

Summarizing these points, these results show that the transition to the new education board system has led to an increase in the number of cases of bullying recognized. These results are consistent with our initial hypothesis that the clarification and assignment of responsibility through system reform has promoted the proactive recognition of bullying, which had previously been overlooked.

[21] The results here are consistent with Nakamuro (2017), which shows that the class sizes in elementary and middle schools do not have a significant effect on the recognized cases of bullying in a municipality in the Kanto region.

Table 4. Transition to the new system and the number of cases of bullying recognized (middle school, all municipalities in Tokyo)

	(1)	(2)	(3)
Variables	OLS	OLS	OLS
reform_imme	0.35**	0.34**	0.36**
	(2.37)	(2.32)	(2.29)
reform_post	0.34	0.33	0.35
	(1.27)	(1.24)	(1.20)
reform_post2	0.83*	0.83*	0.88*
	(1.79)	(1.79)	(1.75)
Class size		-0.04	-0.05
		(-0.60)	(-0.69)
Year dummy	yes	yes	yes
Municipality dummy	yes	yes	yes
Mayor changes dummy	no	no	yes
Constant term	1.84***	3.04	3.33
	(24.01)	(1.52)	(1.56)
Sample size	209	209	209
No. municipalities	56	56	56
Adj. R2	0.115	0.112	0.105
Joint hypothesis test (p-value)	0.0865	0.0869	0.0917

(Note) Numbers in parentheses denote t-values using a standard error that is robust to the correlation of error terms in the municipalities.
***p<0.01, **p<0.05, *p<0.1

VII. Robustness Checks

VII-1. The Effect of Small Villages

In Section 6, we conducted a regression analysis using all available data on municipalities. However, the Tokyo metropolitan area not only includes the 23 special wards but also island villages. Thus, we checked whether the results in Section 6 did not overly reflect the influence of relatively small villages, by conducting the same estimations excluding the observations of village municipalities. The estimation results are reported in Table 5 (elementary school) and Table 6 (middle school). Whereas we observe minor differences in the esti-

Table 5: Transition to the new system and the number of cases of bullying recognized (elementary school, Tokyo excluding villagess)

	(1)	(2)	(3)
Variables	OLS	OLS	OLS
reform_imme	0.27	0.29	0.35*
	(1.44)	(1.60)	(1.82)
reform_post	0.50*	0.51*	0.62**
	(1.79)	(1.87)	(2.11)
reform_post2	1.32**	1.36**	1.53**
	(2.20)	(2.34)	(2.60)
Class size		-0.20	-0.20
		(-1.36)	(-1.31)
Year dummy	yes	yes	yes
Municipality dummy	yes	yes	yes
Mayor changes dummy	no	no	yes
Constant term	1.12***	6.86	6.82
	(13.03)	(1.62)	(1.56)
Sample size	214	214	214
No. municipalities	54	54	54
Adj. R2	0.376	0.381	0.387
Joint hypothesis test (p-value)	0.146	0.101	0.0558

(Note) Numbers in parentheses denote t-values using a standard error that is robust to the correlation of error terms in the municipalities.
***p<0.01, **p<0.05, *p<0.1

mation results from Tables 3 and 4, the magnitude and statistical significance of the estimated coefficients are nearly the same. These results show that the results in Section 6 are robust even with the exclusion of the effects of villages with relatively smaller elementary and middle schools.

VII-2. Poisson Regression

In Section 6, we used the logarithm of cases of bullying recognized as the dependent variable. However, approximately 11 percent of municipalities in the case of elementary schools and 15 percent of municipalities in the case of middle schools reported zero cases of bullying recognized; these municipalities were excluded from the sample in Section 6. In

Table 6. Transition to the new system and the number of cases of bullying recognized (middle school, Tokyo excluding villages)

	(1)	(2)	(3)
Variables	OLS	OLS	OLS
reform_imme	0.35**	0.35**	0.37**
	(2.37)	(2.34)	(2.31)
reform_post	0.34	0.33	0.36
	(1.27)	(1.25)	(1.22)
reform_post2	0.84*	0.83*	0.89*
	(1.79)	(1.80)	(1.76)
Class size		-0.05	-0.06
		(-0.67)	(-0.78)
Year dummy	1.81***	3.25	3.63
	(23.64)	(1.50)	(1.56)
Sample size	206	206	206
No. municipalities	54	54	54
Adj. R2	0.115	0.113	0.105
Joint hypothesis test (p-value)	0.0884	0.0864	0.0912

(Note) Numbers in parentheses denote t-values using a standard error that is robust to the correlation of error terms in the municipalities.
***p<0.01, **p<0.05, *p<0.1

order to investigate the effects of excluding these observations, we estimated the effects of the system transition using a Poisson regression with recognized cases of bullying as a dependent variable. The estimation results are summarized in Table 7 (elementary school) and Table 8 (middle school).

The results in Table 7 confirm the robustness of the results in Section 6, that the transition to the new system led to an increase in cases of bullying recognized in elementary schools. By contrast, the results in Table 8 show that, in the case of middle schools, the coefficients of system transition were all positive but revealed no statistical significance except in column 3, on the effects after two years. Based on these results, we observe that the effects of the system transition on the increase in cases of bullying recognized are robust against the inclusion of data from municipalities reporting zero cases of bullying for elementary schools, but not for middle schools.

Table 7. Transition to the new system and the number of cases of bullying recognized (elementary school, all Tokyo municipalities, Poisson regression)

	(1)	(2)	(3)
Variables	OLS	OLS	OLS
reform_imme	0.86**	0.80**	0.84**
	(2.18)	(2.04)	(2.14)
reform_post	0.70*	0.59	0.67
	(1.70)	(1.58)	(1.63)
reform_post2	1.78***	1.67***	1.82***
	(3.31)	(3.21)	(3.35)
Class size		0.11	0.16
		(0.78)	(1.05)
Year dummy	yes	yes	yes
	yes	yes	yes
Sample size	no	no	yes
No. municipalities	228	228	228
Adj. R2	57	57	57

(Note) Numbers in parentheses denote t-values using a standard error that is robust to the correlation of error terms in the municipalities.
***p<0.01, **p<0.05, *p<0.1

Table 8. Transition to the new system and the number of cases of bullying recognized (middle school, all Tokyo municipalities, Poisson regression)

	(1)	(2)	(3)
Variables	OLS	OLS	OLS
reform_imme	0.06	0.04	0.10
	(0.23)	(0.17)	(0.44)
reform_post	0.09	0.05	0.18
	(0.25)	(0.14)	(0.53)
reform_post2	0.62	0.58	0.76*
	(1.48)	(1.39)	(1.83)
Class size		-0.05	-0.02
		(-0.39)	(-0.22)
Year dummy	yes	yes	yes
	yes	yes	yes
Sample size	no	no	yes
No. municipalities	224	224	224
Adj. R2	56	56	56

(Note) Numbers in parentheses denote t-values using a standard error that is robust to the correlation of error terms in the municipalities.
***p<0.01, **p<0.05, *p<0.1

VIII. Conclusion

In this paper, we examined the incentive effect of accountability by estimating the causal effect that the municipal transition to the new education board system had on the cases of bullying recognized using municipality-level panel data in Tokyo. Our results show an increase in cases recognized among the municipalities that had transitioned at an early stage to the new education board system. These results are consistent with our hypothesis that the improvement of the accountability system promoted the proactive recognition of cases of bullying that had previously been overlooked. Given the stance of the Ministry of Education, Culture, Sports, Science and Technology that the recognition of bullying is the first step to finding a solution, the results suggest that the reform of the education board system yielded a positive outcome.

This study focused on the number of cases of bullying recognized to examine the effects caused by the institutional reform. However, the real aim of the system overhaul was to reduce the number of cases of bullying; thus it is necessary to observe longer-term trends to

analyze these effects. In addition, the clarification and assignment of responsibility among schools and education boards may also have an effect on educational outcomes such as academic achievement or physical fitness. Therefore, the long-term analysis of the effects of the reform of the education board system on various indicators such as problematic behavior, academic achievement, and physical fitness, is indispensable for comprehensive evaluation of the system changes. We would like to note this as a task for the future with high priority.

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